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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

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September 25, 2000

VIA HAND DELIVERY

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

**Re: Comments of Nokia, Inc.
 in WT Docket No. 96-86**

Dear Ms. Salas:

Enclosed for filing please find the original and nine (9) copies of the Comments of Nokia, Inc. in the above-referenced docket.

Please stamp and return to this office with the courier the enclosed extra copy of this filing designated for that purpose. Please direct any questions that you may have to the undersigned.

Respectfully submitted,

Lawrence R. Sidman

Lawrence R. Sidman

Enclosures

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**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

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OFFICE OF THE SECRETARY

In the Matter of)	
)	
The Development of Operational,)	
Technical and Spectrum)	WT Docket No. 96-86
Requirements For Meeting Federal,)	
State and Local Public Safety)	
Communication Requirements)	
Through the Year 2010)	
)	
Establishment of Rules and)	
Requirements for Priority Access)	
Service)	

Comments of Nokia Inc.

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Date: September 25, 2000

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Exhibit A

Executive Summary

This proceeding presents the Commission with a unique opportunity to ensure that nationwide interoperability in the 700 MHz band is achieved and that public safety spectrum is used as efficiently as possible, while introducing competition into the market for public safety telecommunications equipment. This can be achieved by establishing a uniform standard of 6.25 kHz voice efficiency; adopting APCO Project 25 Phase I ("Phase I") only as an interim standard for interoperability; establishing a transition period before Phase I becomes mandatory; and mandating 6.25 kHz voice efficiency on the general use channels.

Nokia agrees with the Commission's tentative conclusion to adopt Phase I as an interim interoperability standard, provided that a reasonable transition period is established before the standard becomes mandatory. A transition period until 2005 will not delay the availability of nationwide interoperability because interoperability, as a practical matter, is not required until incumbent TV operators vacate the band and State and Local agencies deploy 700 MHz systems. A five year transition period will allow these events to occur while providing equipment manufacturers an incentive to continue to develop equipment with the desired goal of 6.25 kHz interoperability efficiency. At the same time, adopting the standard on an interim basis will provide technical certainty for any systems that require interoperability capability during the transition period.

In addition, the Commission must pursue the goal of providing a migration path to 6.25 kHz voice channel efficiency for interoperability. However, Nokia believes enough technical issues remain unresolved that it is not feasible to establish a hard and fast deadline at this time. To encourage development of 6.25 kHz interoperability technology and equipment for conventional (non-trunked) operations, in this proceeding, the Commission should establish a mandatory channel efficiency standard of one voice path per 6.25 kHz channel for the general use narrowband channels.

Although there currently are technical obstacles to achieving 6.25 kHz efficiency for conventional interoperability purposes, equipment utilizing 6.25 kHz efficiency already is fully developed and available for general use from a wide array of manufacturers, including leading U.S. manufacturers. Adopting this efficiency standard will encourage equipment manufacturers to devote their research and development resources to 6.25 kHz conventional technology. This will accelerate attaining 6.25 kHz efficiency for interoperability.

Once the 6.25 kHz efficiency standard is mandated for general use, spectrally efficient technology will take root in the 700 MHz band, and the Commission will be able to establish an appropriate migration path to 6.25 kHz efficiency for interoperability. Nokia recommends that in 2005 the Commission evaluate equipment deployed in the 700 MHz band and the progress of technical development, and based on this information consider a formal migration path to 6.25 kHz interoperability. The Phase I standard should be made mandatory if in 2005 the Commission determines that 6.25 kHz interoperability is not feasible.

In addition, adopting a 6.25 kHz efficiency standard for general use now will encourage needed competition in the supply of equipment for this band. The 700 MHz band is “greenfield” spectrum without any legacy equipment concerns that otherwise might dictate equipment purchase decisions. This presents a compelling opportunity for manufacturers to market new and innovative spectrum-efficient products. Currently, 6.25 kHz equipment is available from a wide array of manufacturers, including leading U.S. manufacturers. Reserving the general use channels in the 700 MHz band for 6.25 kHz equipment will provide an open market and complete freedom of choice for public safety consumers from multiple manufacturers. This will bring substantial cost and service benefits of competition to the public safety community and ensure the most efficient use of our scarce spectrum resource.

Finally, Nokia addresses some of the more detailed licensing and technical recommendations of the NCC on which the Commission has sought comment. By adopting a competitively neutral approach, predicated on sound technical principles, the Commission will ensure that interoperability is achieved in a way that will result in more effective and efficient public safety communications operations and save both money and lives.

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To the Commission:

Comments of Nokia Inc.

Nokia Inc. ("Nokia") by its counsel and pursuant to Section 1.415 of the Rules of the Federal Communications Commission ("Commission"),¹ respectfully submits these Comments in response to the *Notice of Proposed Rule Making* in the above referenced proceeding.²

I. INTRODUCTION AND OVERVIEW

Nokia is the world's leading supplier of mobile telephones and is a global leader in the manufacture of telecommunications infrastructure and terminal equipment, including that used in mobile and fixed public safety communications. Outside of the United States and Canada, Nokia is one of the leading suppliers of advanced mobile radio systems for public safety and other organizations with critical communications

¹ See 47 C.F.R. § 1.415.

² WT Docket No. 96-86, *Fourth Notice of Proposed Rule Making* (FCC 00-271) (rel. Aug. 2, 2000) ("*Notice*").

needs. Nokia maintains manufacturing facilities in 10 countries and has more than 60,000 employees in over 45 countries around the world, including over 10,000 employees in the United States.

Nokia is pleased to have this opportunity to comment on the Commission's proposals to establish operational and technical rules for the new public safety spectrum in the 764-776 MHz and 794-806 MHz bands ("700 MHz band"). Nokia has followed this proceeding with great interest and participated in meetings of the Public Safety National Coordination Committee ("NCC") during its deliberations on a standard that will allow the public safety community to use interoperability frequencies in the 700 MHz band while final rules for the rest of the 700 MHz band are being developed.

Throughout its involvement in this proceeding and participation with the NCC, Nokia has been guided by the three primary goals set forth by the Commission: nationwide interoperability, spectrum efficiency, and the development of competitive equipment markets.³ The Commission can make significant progress towards each of these goals by adopting the recommendation of the NCC to adopt Project 25 Phase I ("Phase I") as an interim interoperability standard, provided that a reasonable transition period is established before the standard becomes mandatory, and provided the Commission mandates 6.25 kHz voice channel efficiency for the general use channels in this proceeding. By taking these steps, the Commission will encourage the continued development of public safety equipment technologies so that the Commission's goal of migrating to 6.25 kHz interoperability technology can be realized,

³ See WT Docket 96-86, *Second Notice of Proposed Rule Making*, 12 FCC Rcd. 17,706, at ¶ 5; *First Report and Order*, 14 FCC Rcd 152, at ¶¶ 5-6.

while promoting participation in this market by the widest array of equipment manufacturers bringing vibrant competition to the public safety equipment market.

II. THE COMMISSION'S DECISIONS ON INTEROPERABILITY MUST LEAD TO 6.25 KHZ EFFICIENCY.

Public safety spectrum is an exceedingly scarce resource, and it must be used as efficiently as possible to ensure that public safety's communications requirements are met well into the future. Accordingly, the Commission should maintain as a principle goal of this proceeding 6.25 kHz efficiency for both interoperability and general use applications. It can do so by adopting the Phase I standard on an interim basis where 6.25 kHz efficiency is not yet feasible, and by mandating 6.25 kHz in the general use channels where equipment that attains such efficiency is already available.

A. The Most Efficient Spectrum Use is Required to Meet the Identified Needs of the Public Safety Community.

Public safety spectrum is scarce, and increasingly intense use dictates policies that maximize its potential. The Public Safety Wireless Advisory Committee (PSWAC) concluded that over the next 15 years as much as an additional 70 MHz of spectrum – *in addition to the 24 MHz of 700 MHz spectrum* -- will be required to satisfy the communications needs of the public safety community. Despite this identified need, however, it is unlikely that significantly more than the 24 MHz of spectrum at issue in this proceeding will be allocated for public safety in the near future. This makes it even more imperative that the rules adopted by the Commission in this proceeding ensure that this band is used as efficiently as possible.

A wide variety of new communications technologies and capabilities promise to reduce danger to public safety personnel and increase their work efficiency. Broadband data systems and wireless video systems can help realize these objectives.⁴ But the Commission's ability to provide the spectrum necessary to implement these capabilities is severely restrained by demands for spectrum and its intense use by other competing services for applications such as Third Generation cellular and wireless Internet access. It therefore is incumbent upon the Commission to adopt forward-looking policies for the 700 MHz band that recognize the essential public interest in allowing use of only the most efficient spectrum technology, consistent with ensuring the high reliability required of public safety systems.

To that end, Nokia fully supports the Commission's decision, in adopting the 700 MHz band plan, to establish the standard bandwidth of 6.25 kHz for the narrowband data channels.⁵ Nokia now urges the Commission to ensure that these 6.25 kHz channels are used to achieve 6.25 kHz efficiency for voice communications as well. The Commission's definition of channel efficiency for the 700 MHz band⁶ should be amended to be identical to that applicable to all other private land mobile services, including public safety, for approval of equipment after 2004 designed to operate below 512 MHz.⁷ The definition requires the ability to transmit one voice channel per 6.25 kHz

⁴ PSWAC Final Report at pp. 2,3; see *also* the Spectrum Requirements Subcommittee Summary at pp. 56 – 65 discussing specific public safety requirements for a wide variety of voice, data, and video services.

⁵ See *First Report and Order* at ¶ 38.

⁶ 47 C.F.R. § 90.535(b).

⁷ See 47 C.F.R. § 90.203(j)(5).

or equivalent. Nokia believes that this standard is appropriate for 700 MHz equipment as well as for equipment operating on frequencies up to 512 MHz in public safety services.

B. The Interoperability Channels Must Employ Conventional Non-Trunked Technology.

In making its recommendation to the Commission, the NCC noted that most interoperability communications will occur at the scene of an incident on a unit-to-unit basis, not through an infrastructure.⁸ The NCC therefore concluded that if trunking were mandated on the interoperability channels, which would result in additional complexity and cost, all mobile units would be required to employ trunking.⁹ Accordingly, the NCC recommended, and the Commission tentatively concluded, that trunking should not be mandated for interoperability purposes.¹⁰

Nokia agrees with the NCC's recommendation. In order to guarantee reliable operation, interoperability must be based on simple, non-trunked channels in simplex or semiduplex mode. Allowing trunking for interoperability purposes would be operationally complex, and would result in unnecessarily complex and expensive subscriber equipment with limited efficiency gain. Therefore, trunking should be expressly prohibited for interoperability purposes, as the Commission suggests.¹¹

⁸ See NCC Report at 7, ¶ 17.

⁹ *Id.* at 7, ¶ 18.

¹⁰ See Notice at ¶ 9.

¹¹ Nokia supports the NCC's concept of allowing trunking on a limited number of interoperability channels on a secondary basis (*see infra*).

C. Phase I is an Appropriate Interim Standard Pending Development of 6.25 kHz Conventional Equipment for Interoperability.

In the *Notice*, the Commission acknowledged the technical difficulties associated with 6.25 kHz efficiency for interoperability and tentatively concluded that it should adopt the NCC's recommendation of Phase I as an interoperability standard on an interim basis. The Commission also determined that there should be a migration path to a 6.25 kHz interoperability standard¹² and sought comment on the technical challenges the industry must overcome to migrate to a 6.25 kHz interoperability standard.¹³

While technology providing 6.25 kHz efficiency for conventional terminal-to-terminal voice operation required for interoperability is being developed, it is appropriate to adopt as an interim standard for voice terminal-to-terminal interoperability technology based on conventional 12.5 kHz efficiency. Such a standard must be capable of being integrated into equipment that uses other technologies. Phase I meets these criteria, and therefore is acceptable as an interim standard for interoperability.¹⁴ Therefore Nokia supports the Commission's tentative conclusion to adopt Phase I as an interim interoperability standard, provided that the Commission establish a reasonable transition period before the standard becomes mandatory, *infra*.

¹² See *Notice* at ¶ 46.

¹³ *Id.* at ¶ 47.

¹⁴ To ensure clarity in the record, Nokia did not oppose Phase I for interoperability use. Rather, Nokia proposed that Phase I be non-mandatory and suggested the possibility of an optional alternative technology. See *Notice* at ¶ 45.

D. The Commission Must Encourage Continued Innovation by Establishing a Transition Period Before Phase I Capability Becomes Mandatory.

As noted above, Nokia accepts the recommendation of the NCC that Phase I be adopted as the interoperability standard on an interim basis. However, this interim interoperability standard should not be allowed to result in the enshrinement of Phase I as the *de facto* standard for the general use channels as well. To avoid such a spectrum-inefficient outcome, and to preserve the viability of competing technologies, manufacturers must have incentives to continue to develop equipment that employs more spectrum-efficient 6.25 kHz technology for interoperability.

The Commission can expedite development of 6.25 kHz conventional technology by establishing a transition period before Phase I capability becomes mandatory for all 700 MHz equipment. During this transition period, Phase I will be the standard for interoperability. A transition period before Phase I capability becomes mandatory will permit manufacturers of competing technologies to continue to develop more spectrally-efficient technologies for conventional use.

In addition, a transition period will give manufacturers an opportunity to integrate Phase I capability into equipment employing more spectrum-efficient technology for the general use trunked channels. The technical considerations involved in integrating Phase I compatibility, including the development of chip sets for integration, involve substantial amounts of research and development, engineering, and personnel resources, and can take a significant amount of time to accomplish. This time is necessary in order to develop a competitive product that meets the needs of public safety agencies in terms of cost, size and functionality.

Without this transition period, Nokia believes that manufacturers may abandon ongoing development plans and embrace Phase I in order to offer FCC-compliant products. If this occurs, the Commission's objective of allowing public safety agencies "to independently select equipment and technologies that best meet their particular communications needs"¹⁵ will be defeated, and the development of more efficient interoperability technologies will grind to a halt. This undesirable outcome is avoidable, because a transition period will not delay interoperability due to other unrelated factors.

E. Mandatory Interoperability is not Necessary Until Incumbent TV Operations are Cleared From the Band and Public Safety Agencies Develop and Deploy 700 MHz Systems.

Nokia understands the Commission's concerns with the potential for delay in the deployment of equipment for the interoperability channels,¹⁶ and realizes that its proposed transition period could be misinterpreted to appear to cause delay. However, mandating interoperability will not be necessary immediately. As a practical matter, direct terminal-to-terminal interoperability in the 700 MHz band will be necessary only if and when two systems employing different technologies are deployed in the same general geographic area, thereby creating the possibility that personnel of two or more agencies using dissimilar 700 MHz equipment will be involved in the same emergency. However, the encumbered nature of the 700 MHz spectrum, the time necessary to complete the DTV transition, and the time required to develop and deploy wide-area public safety systems combine to make it unlikely that such multiple systems will be widely deployed before 2005. These facts justify a reasonable transition period before

¹⁵ See *First Report and Order* at ¶ 130.

¹⁶ See *Notice* at ¶ 46.

Phase I compatibility is mandatory. Such a period will not cause additional delay in achieving interoperability. In addition, this transition period will not delay the Commission in licensing this spectrum for use in those areas where it is free of broadcast interference.

As the Commission is well aware, there are a significant number of television stations operating on the channels reallocated for public safety use.¹⁷ These television stations will retain primary status until at least 2006 under the DTV transition plan adopted by Congress.¹⁸ However, most industry observers, including members of Congress, believe that the transition will extend beyond 2006. In a recent hearing before the House Telecommunications Subcommittee, Congressman Markey remarked "there is no longer a soul in the industry who thinks the transition will be over by the year 2006."¹⁹ Due to these television operations, spectrum for multiple public safety services

¹⁷ See *Auction No. 31 Announcing Public Notice*, at Attachment J.

¹⁸ See 47 U.S.C. §§ 336-337. Nokia is aware that the Commission has commenced a proceeding to expedite the clearance of incumbent television stations from the 36 MHz of spectrum in the 700 MHz band that has been allocated for commercial services. See WT Docket 99-168, *Further Notice of Proposed Rule Making*, (FCC 00-224). To the extent that commercial operators feel the necessity to expedite the relocation of television stations from spectrum allocated for public safety in order to eliminate adjacent channel interference, the availability of public safety spectrum in some markets may be accelerated. Nevertheless, Nokia does not believe that the Commission's band clearance proceeding will significantly impact the availability of 700 MHz public safety spectrum before 2005 as a practical matter.

¹⁹ Remarks of Congressman Edward J. Markey, Hearing of the Telecommunications Trade and Consumer Protection Subcommittee of the House of Representatives, July 25, 2000, (Federal News Service Transcript).

in the 700 MHz band will be unavailable in many urban markets for the foreseeable future.²⁰

Similarly, even in markets where spectrum is immediately available it is unlikely that 700 MHz systems will be deployed in less than five years. Modern state-of-the-art public safety systems resemble complex cellular systems and require years of planning, design and development. For example, a typical wide area public safety system would go through the following phases of development before deployment:

SYSTEM DEVELOPMENT TIME FOR 700 MHz	
Government Approval and Appropriations	6 – 12 months
Hiring of Consultants Issuance of Request for Proposal	12 – 18 months
Manufacturers Submit Proposals, Proposals Reviewed, Contracts Awarded	6 – 18 months
Development, Site Acquisition, Construction, Testing	2 – 5 years
Total Time Elapsed Before System Operations Begin	4 – 9 years

Taking into account the time to clear the 700 MHz band of incumbent TV stations, and the time required to design, build, and deploy 700 MHz public safety systems, it is apparent that interoperability will not be of utility as a practical matter before 2006-2008 at the earliest. Accordingly, a reasonable transition period before

²⁰ Because the 700 MHz Band Plan pairs mobile and base frequencies on different TV channels (e.g. mobile frequencies on channel 63 are paired with base station frequencies on channel 68) both channels must be cleared in a given geographic area before a public safety system can be deployed. In the case of the Interoperability channels the need for both channels to be available is even more pronounced because the Commission has declined to allow non-standard channel pairing on these channels, increasing the likelihood that a single television station in a given market can block the availability of public safety spectrum on two of the four 6 MHz blocks of public safety spectrum. See *First Report and Order* at ¶ 30.

Phase I equipment becomes mandatory will not delay effective nationwide interoperability.

III. THE COMMISSION SHOULD UTILIZE A MARKET-BASED APPROACH FOR ESTABLISHING THE MIGRATION PATH TO 6.25 KHZ INTEROPERABILITY

Although the Commission has tentatively concluded that 12.5 kHz Phase I technology is an appropriate interim interoperability standard, the Commission also made clear its firm intention to later require 6.25 kHz spectrum efficiency on the interoperability channels.²¹ Thus, in order to “avoid even the specter of delay,” the Commission sought comment on an appropriate “migration path” to a 6.25 kHz standard for interoperability.²²

A. The Commission Should Mandate 6.25 kHz Efficiency for the General Use Channels to Ensure that the Migration Path to 6.25 kHz Interoperability Will be Achieved.

Nokia agrees with the Commission that a formal migration path to 6.25 kHz efficiency is necessary to ensure long-term spectrum efficiency in this band. However, there remains significant technical development to achieve 6.25 kHz voice efficiency with equipment operating in the conventional terminal-to-terminal mode. The Commission should encourage and accelerate the eventual migration to 6.25 kHz interoperability. Specifically, by adopting 6.25 kHz voice efficiency in the general use channels, the Commission will harness market forces to ensure the most rapid migration possible to 6.25 kHz technology for interoperability.

²¹ Notice at ¶ 47.

²² *Id.*

While It is difficult to predict with certainty exactly when such technology will be available, and therefore what an appropriate date may be to mandate such efficiency, adopting a market-based approach to this transition will produce tangible results by encouraging all equipment manufacturers to focus their resources on developing 6.25 kHz conventional equipment.

Equipment that achieves 6.25 kHz efficiency for general use is competitively available now from multiple manufacturers worldwide, including leading U.S. manufacturers.²³ Encouraging the manufacturers of this equipment to enter the U.S. public safety market will foster an installed base of 6.25 kHz equipment and create an incentive to develop 6.25 kHz conventional equipment for interoperability.

By contrast, if the Commission authorizes the use of 12.5 kHz equipment in the general use channels, any incentives to develop 6.25 kHz equipment will be minimized and the migration path to 6.25 kHz will be set back by years, if not permanently. Manufacturers have limited resources to devote to the development of new products and technologies. If 12.5 kHz technology is permitted on the general use channels, research and development resources will be devoted to 12.5 kHz technology and at best only limited resources will be made available to overcome the technical obstacles associated with 6.25 kHz interoperability.

The Commission recognized the operation of market forces when it rejected FM analog technology as the interoperability standard in the *First Report and Order*. There,

²³ Representative announcements of public safety systems being deployed around the world that employ 6.25 kHz efficiency equipment are attached at Exhibit A.

the Commission expressed its concerns about encouraging the deployment of obsolete technology stating:

First, if we allow the construction of analog-only systems in this band, this could once again create a situation where a public safety band becomes encumbered with a significant investment in an obsolete technology. Second, the availability of less expensive analog-only equipment could diminish the market for digital equipment, resulting in delay and higher costs for those users who do wish to buy digital equipment in order to obtain its benefits.²⁴

The exact same concerns should govern the Commission's policies as it considers a migration path to 6.25 kHz technology for interoperability. First, if the Commission permits 12.5 kHz to take hold on the general use channels, not only will the band become congested with technology that is demonstrably inefficient, but inertia will set in with regard to migrating to 6.25 kHz efficiency for interoperability. What incentive will remain for users and manufacturers to pursue 6.25 kHz interoperability if 12.5 kHz becomes the *de facto* standard for general use? Second, allowing 12.5 kHz technology to be deployed in the general use channels will clearly diminish the market for 6.25 kHz equipment and cause significant delay in the introduction of 6.25 kHz technology appropriate for interoperability. Such a result would be in direct conflict with the Commission's stated objective of establishing a migration path to 6.25 kHz interoperability.

B. In 2005, the Commission Should Review Equipment and Technology Development and Adopt a Formal Migration Path to 6.25 kHz Interoperability.

As noted above, Nokia does not believe that there is sufficient technical certainty at this time regarding the development of 6.25 kHz equipment for interoperability to

²⁴ *First Report and Order* at ¶ 108.

establish a firm migration path. However, if the Commission establishes a transition period and mandates 6.25 kHz efficiency for general use, spectrally efficient technology is much more likely to develop and take root in the 700 MHz band. The Commission can evaluate an appropriate migration path to 6.25 kHz interoperability once 6.25 kHz technology begins to be deployed.

Nokia recommends that in 2005, the Commission review the state of technological development for 700 MHz band equipment and determine the timing for a formal migration path to 6.25 kHz interoperability. If in 2005 the Commission determines that the prospects for 6.25 kHz interoperability have not improved, the Phase I standard should be made mandatory. Mandating Phase I compatibility at that time will ensure that all manufacturers produce Phase I compatible equipment as interoperability becomes feasible with the clearance of TV stations from the band and systems under development begin to be deployed.

IV. THE COMMISSION MUST TAKE ALL STEPS PRACTICABLE TO ENSURE THAT THE PUBLIC SAFETY COMMUNITY REAPS THE BENEFITS OF COMPETITION.

Both Congress and the Commission promote competition as one of the primary goals of communications policy. The Telecommunications Act of 1996 ushered competition into local telecommunications markets and promoted competition in multi-channel video programming distribution services. Likewise the Commission pursues policies to introduce competition into previously closed markets. The Commission's efforts to promote competition in the local and long distance markets, the auctioning of new spectrum for the introduction of competitive new services, and the implementation of the Satellite Home Viewer Improvement Act to produce meaningful competition to

cable, are just a few examples. As a result of these policies, American consumers are enjoying lower prices and higher levels of new and innovative services.

Sadly, this record of competitive innovation has not yet extended to the public safety communications equipment market. As noted by Wireless Bureau Chief Thomas Sugrue in remarks before the NCC:

[I]t is not only technical issues [we] need to be concerned about. The most technically perfect recommendations will do little good if they act to restrain competition and render 700 MHz public safety systems unaffordable . . . [T]he Public Safety community will be best served if the recommendations adopt[ed] result in vigorous competition among manufacturers.²⁵

In stark contrast to other markets for telecommunications equipment, the market for public safety telecommunications infrastructure and handsets is dominated by a single supplier. For the most recent years for which records are available, Motorola has supplied over 80 percent of the public safety communications equipment.²⁶ A variety of factors contribute to this market concentration, and this is not to suggest that Motorola has abused its monopoly status. Nevertheless, the benefits of competition are well known and the Commission should not be satisfied until such benefits are extended to the Public Safety marketplace.

²⁵ Remarks of Thomas Sugrue, Chief, Wireless Telecommunications Bureau, to the NCC, January 14, 2000, at 7.

²⁶ See *Private Radio Markets & User Trends*, The Strategis Group Report, Section 4.8 (March 1999). The Strategis Report puts Motorola's share of the installed base of land mobile radio handsets in 1998 at 82%. This report analyzed the entire private land mobile radio market and did not report separately on the public safety equipment market. Based on Nokia's own estimates, Motorola's share of the public safety equipment market is significantly higher than its share of the overall land mobile market.

Significantly, the insular public safety marketplace in the U.S. stands in stark contrast to many areas of the world where the public safety market is fiercely competitive. For example, in Europe no single manufacturer maintains a dominant market share and several manufacturers compete for public safety business. The benefits of this competition are readily apparent when the prices for common communications equipment in Europe are compared with prices for similar equipment in the U.S. In Europe a typical public safety digital system handset costs between \$1,000-2,000. In contrast, similar equipment in the United States sells for approximately \$2,000-4,000.²⁷ Competition is the most important differentiating factor for this startling price difference. There is competition in Europe. There is no effective competition here in the United States.

While this illustration of price differences is dramatic, it becomes all the more so when viewed in the context of a typical state-wide public safety system. For example, a typical state-wide public safety communications system may support upwards of 25,000 handheld terminal units. Applying a conservative estimate of the cost savings described above of \$1,000 per handset produces a savings of \$25,000,000 for handsets in just one system alone. The impact of savings of this magnitude on States and Municipalities cannot be overstated. Given the limited resources of public safety agencies, the millions of dollars saved in communications equipment costs could be redirected to vital non-communications public safety equipment, or used to hire

²⁷ Price figures for European equipment were obtained from the 2000 TETRA Workshop. See <www.tetraforum.org> (Visited September 24, 2000). U.S. figures are based on Nokia's best estimates and internal data.

additional personnel, or simply passed back to the taxpayers that ultimately foot the bill for all public safety expenses.

Not only would increased competition result in lower prices for public safety communications equipment, but it also would usher in new and innovative services. This would result in ever more efficient and effective public safety communications operations, saving both money and lives. The transformation of all wireless communications from analog to digital technologies has resulted in a whole panoply of new data service applications. The public safety community, perhaps more than any other, stands to benefit from these new developments. Whether it is delivering detailed floor plans and diagrams of a burning building to firefighters, or giving police officers the ability to access remote criminal databases, or enabling emergency response medical personnel to forward critical patient data to the hospital, these new data applications promise great improvements to the delivery of nearly all public safety services. Even more applications useful to public safety such as live video, intranet and internet access, and location dependent services may be delivered to portable terminals if innovation and open interfaces are nurtured.

As with every other telecommunications industry, the best way to promote rapid development of these services is through competition. The Commission's decisions in this proceeding are critical. By avoiding unnecessary technical barriers, establishing a competitively neutral interoperability standard, and promoting the widest possible participation in the public safety communications equipment market, the Commission will ensure that this market reaps the benefits of competition enjoyed by the rest of the communications equipment and services industries.

V. ADDITIONAL LICENSING AND TECHNICAL ISSUES

In addition to the broader policy questions detailed above, in the *Notice* the Commission seeks comment on a number of the discrete licensing and technical recommendations proposed by the NCC. Nokia generally agrees with the NCC recommendations on access priority, calling channels, narrowband low speed standards, encryption, and access to the interoperability spectrum by Federal agency users. Our comments on several additional issues are below.

A. Permissive Trunking

The NCC recommended that the Commission permit trunking on ten of the interoperability channel sets on a secondary-only basis, subject to immediate preemption when needed for emergency interoperability situations. This would allow the channel sets to be used during the majority of the time when the channels are not required for interoperability purposes. The Commission proposed to adopt the NCC's recommendation, provided that trunked operation is discontinued immediately whenever the channels are required for interoperability.²⁸

Nokia agrees in principle with the NCC's recommendation to permit trunking on a limited number of interoperability channel sets. To ensure that secondary trunking does not interfere with interoperability, a simple and foolproof method of ensuring that these channels are released when required for emergency purposes must be utilized.

In recent simulations Nokia tested methods with a release/changeover time from secondary trunking to conventional interoperability of 2–5 minutes within its TETRA-compliant system. Given the response time usually necessary for public safety units to

²⁸ See *Notice* at ¶¶ 10-13.

arrive on the scene of a crisis from an adjacent jurisdiction, we believe that this 2-5 minute changeover time would be adequate. Allowing the use of these ten interoperability channels therefore appears to be justified, so long as their timely conversion from trunked to interoperable conventional status is assured.

B. Guard Channels

The NCC supported consideration of Ericsson's proposal that the interoperable channel plan be rearranged to consist of 16 pairs of four contiguous 6.25 kHz channel sets (totaling 25 kHz each). Alternatively, the NCC supported preserving as "guard channels" the two 6.25 kHz reserve channels immediately below the interoperability channel sets on which secondary trunking is proposed. The Commission expressed its preference for designating the two contiguous reserve pool 6.25 kHz channels either immediately above or below each 12.5 kHz channel set.²⁹

Nokia wishes to emphasize that the alignment of the interoperability channels must be maintained in a technologically neutral manner so as not to preclude use of any valid technology in the future. Therefore Nokia proposes designating "guard channels" below *all* of the interoperability channel sets, even if the Commission does not allow secondary trunking on all of these channels.³⁰

²⁹ *Id.* at ¶¶ 14-18.

³⁰ This proposal is entirely consistent with the Band Plan adopted in the *First Report and Order*. See *First Report and Order* at Appendices E and H.

C. Channel Designation and Display Labeling

The Commission sought comment on the NCC's proposal for a table of specific channel assignments for the interoperability channels.³¹ Nokia advocates a flexible and user configurable channel designation and labeling scheme to guarantee ease of use. Most modern radio systems and subscriber units have configurable methods of programming parameters for designations and labels, so there does not appear to be a strong need for a single required scheme.

Nevertheless, Nokia understands the necessity of rigidity in certain of the parameters where users require a certain "familiarity." To this end, Nokia suggests that mandating requirements is acceptable so long as all such parameters can be programmable. In practice this means that, for example, certain alphanumeric fields are pre-defined. In addition, it must be stressed that the scheme adopted must provide for 6.25 kHz voice channels and any aggregate thereof.

D. Channel Efficiency Standards

The Commission should require speech channel efficiency of 6.25 kHz, as discussed above. Contrary to statements by some, public safety systems that attain an efficiency of 6.25 kHz per voice channel are available and in use today in other countries from a number of manufacturers, including Motorola as well as Nokia. Indeed, currently Motorola is the largest supplier of such systems worldwide, and Nokia is second. We also note that TETRA has been standardized by ETSI in Europe. In the United States TETRA is under review in the ANSI standardization process and we expect that process to be complete within the next year or two.

³¹ *Id.* at ¶ 33.

E. Receiver Standards

Nokia fully understands the requirements stated within this section, but wishes to point out the complexity of this task. There could be several technical solutions coexisting within the 700 MHz band. For example, it would be impossible to have a single receiver standard that would cover both 6.25 kHz FDMA receivers and another 6.25 kHz equivalent technology such as TETRA. Therefore Nokia recommends that if the Commission decides to adopt receiver standards, such standards either must be technology independent, or multiple standards must be adopted that are appropriate for each technology used in the 700 MHz band. Such standards should rely on fundamental specifications, such as receiver front end performance and filtering.

VI. CONCLUSION

Nokia commends the Commission for taking this important step to establish the operational and technical rules necessary for the introduction of new public safety services in the 700 MHz band. This proceeding presents the Commission a unique opportunity to ensure that nationwide interoperability in the 700 MHz band is achieved and that public safety spectrum is used efficiently, while introducing the full benefits of a competitive market for public safety communications equipment. This best can be achieved by establishing a uniform standard of 6.25 kHz voice efficiency; adopting APCO Project 25 Phase I ("Phase I") as an interim interoperability standard; granting a transition period before Phase I becomes mandatory; and mandating 6.25 kHz voice efficiency on the general use channels.

Respectfully submitted,

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Date: September 25, 2000

EXHIBIT A



Press Release

Hong Kong Police to Purchase Digital Nokia TETRA System

(November 12, 1999) - Nokia has been awarded a contract to supply a Nokia TETRA professional mobile radio network to the Hong Kong Police, in Hong Kong SAR. The contract is valued at over USD 18 million and deliveries will start in February 2000.

The agreement, which is the first TETRA deal for Nokia in China, includes five sub-systems: Transport Network, Marine Voice, Automatic Vessel Location, Messaging and Crime Units Sub-systems.

"This is an important step for the application of TETRA for the police force in Hong Kong," says Mike Mulvey Managing Director, Nokia Networks, Nokia (H.K.) Ltd. "This marks a new TETRA customer for Nokia and strengthens the position of the TETRA standard in Asia Pacific and China."

The contract covers a complete Nokia TETRA system including digital exchange, base stations, dispatching equipment, network management system, terminals, and related customer services, including system integration.

Nokia is one of the world's leading suppliers of TETRA systems, consisting of digital exchanges, base stations, dispatcher system and network management centre. The infrastructure is supported by Nokia's mobile and handportable radio terminals and accessories.

Nokia is paving the way to the mobile information society with its innovative products and solutions. Nokia is the world's leading mobile phone supplier and a leading supplier of mobile, fixed and IP networks including related services. It also supplies multimedia terminals and computer displays. In 1998, net sales totalled EUR 13.3 billion (USD 15.7 billion). Headquartered in Finland, Nokia is listed on the New York (NOK), Helsinki, Stockholm, London, Frankfurt and Paris stock exchanges and employs more than 53 000 people.

Notes to Editors:

March 1998, Dolphin and Nokia announced a contract for the delivery of the world's first nationwide commercial TETRA network to the United Kingdom. In December 1997, Nokia signed a contract for the delivery of the world's first nationwide TETRA network for the Finnish Ministry of Interior. In June 1998, Nokia as part of the KNT consortium, was chosen to provide a TETRA nationwide network to Belgian public safety and security authorities with the project named ASTRID.

In January 1999 Dolphin Telecom and Nokia signed a contract for the delivery of nationwide TETRA network in France and in May 1999 Centre de Telecomunicacions de la Generalitat de Catalunya and Nokia signed a contract for the delivery of a digital TETRA professional mobile radio network in Catalonia, Spain. In August this year Nokia has been selected as a supplier to deliver a digital TETRA professional mobile radio network to Arma Dei Carabinieri, in the Lazio region in Italy.

Nokia's other TETRA customers include Helsinki City Energy Company, EITele Öst of Norway, TeleDanmark in the Netherlands and Austrian operator Well.COM.

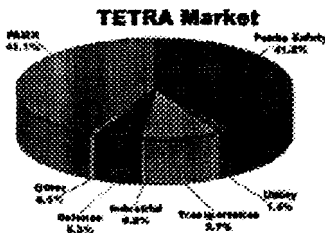
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01 / 2000

TETRA Market Success



There are already more than 50 contracts and commitments for TETRA worldwide and the number is rapidly increasing. The estimated market value of existing commitments already exceeds US\$2 billion. The original mandate for TETRA was to serve all traditional PMR and PAMR market segments. These original objectives have already been met as can be seen by the market segments being served by TETRA. In addition, TETRA is being deployed for military applications.

Simoco order for TETRA in Spain

Difusio Digital Societat de Telecomunicacions (DDST) in Spain has ordered 2700 terminals for use by the Fire Brigade of Catalunya on the Regional Government TETRA system. The new system set up by Centre de Telecomunicacions of Catalunya is responsible for providing communications to regional government agencies including the Fire Brigade. The contract placed with Simoco is valued at 570M Ptas (3,42M Euros). Delivery of the 1000 SRM1000 TETRA mobiles and 1700 x SRP1000 TETRA Portables, together with associated ancillaries, commenced in March.

Largest ever TETRA contract

The UK government has awarded the contract for the delivery of the PSRCP (Public Safety Radio Communications Project) to BT. Valued by the British Home Secretary Jack Straw at £2.5 billion, the contract covers the installation and supply of all the equipments and services. This is not only the largest TETRA contract to date, it is also the largest public safety contract ever awarded. The complexity of the specification meant it was a long and arduous process, but the result is that the UK can finally look forward to a state-of-the-art national communications system. Over the next four years BT will roll out a nationwide integrated voice and data network running in the 380-400MHz band reserved for use by the emergency services. Initially for use by the regional police forces, other blue light and public safety organisations are expected to take their communications from the service as the rollout progresses. The process has already begun with the setting up of a pilot project in Lancashire. Half the radio sites have been acquired and the installation is expected to be complete soon, enabling the service pilot to begin in earnest in September. This will provide three to four months evaluation of the full service. From September, the police will use the TETRA-based system in live operation, while the Lancashire Fire Service will test the system and the county's ambulance division will closely observe progress. At the same time as the pilot is running, BT will also begin work on the main rollout, as only if this happens will it be able to stick to the required timetable. This will see nine forces from England and Wales covered in 2001, 13 more in 2002, a further 14 in 2003 and the final five in 2004. BT will deliver and run the system with the aid of two major subcontractors: Motorola for the TETRA network infrastructure and TRW for systems integration. Motorola won the infrastructure contract in the face of competition from Nokia which was also part of the BT-led Quadrant consortium charged with carrying out the development study. Motorola's John Doughty pointed to Motorola's 50 years experience in the public safety market and the company's ability to deliver to the required timetable as major factors influencing the decision. He also confirmed that by 2005 the network core will be IP using Motorola's Aspira product group meaning that the network will benefit from the efficiencies of IP. Handsets, mobile terminals and a range of other peripherals will be purchased by individual police forces and are open to full competition from the broad range of suppliers including Marconi and Simoco, as well as Nokia and Motorola. The service itself will be delivered in two

distinct parts. Core services including voice, messaging and a bearer data service providing access to the Police National Computer (PNC) will be provided to all forces. These core services also utilise the inherent security of digital operation which overcomes the eavesdropping problems associated with analogue. Also included as standard are basic requirements for coverage and capacity. These are then added to with "menu" services which can be specified by each individual force. By taking such an approach BT has overcome one of the major concerns in which forces feared either subsidising the more demanding metropolitan or being unable to make full use of TETRA's functionality because most other forces did not require the service.

Editor-in-chief: Bob Lovett



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The First TETRA contract awarded in South Africa will be supplied by Motorola

17TH August 2000 Capetown, South Africa. In a move set to revolutionise the way in which the Cape municipalities and public safety services communicate, the Cape Metropolitan Council (CMC) has awarded a contract worth approximately R55 million for the provision of South Africa's first digital two-way radio communication infrastructure to Alcom, a subsidiary of the Altech group. Motorola (NYSE:MOT), the world's leading supplier of digital trunked radio systems and handsets, has been selected as the equipment provider.

The system selected by the CMC will be based on TETRA (Terrestrial Trunked RAdio) technology. It is the first time digital technology will be implemented in South Africa for professional mobile radio users and the CMC is the first local authority on the African continent to install such a system.

"We have chosen this system for a number of reasons," says Carl Schneider, manager of electrical engineering, CMC. "Firstly, TETRA is one of the most exciting new technologies on the market today. Secondly, TETRA makes the most efficient use of the valuable, limited and exhaustible frequency spectrum. And thirdly, TETRA is the most cost-effective solution for metropolitan areas."

TETRA, which has been widely adopted globally, is the PMR standard created by the European Telecommunications Standards Institute to provide police, fire and ambulance services across Europe with a secure and interoperable radio infrastructure, bringing about a new generation of digital land mobile radio communications.

With a call set-up time of less than 300 milliseconds, the highly sophisticated range of digital radio equipment not only allows users to relay vital information directly to those who need it in a variety of formats including data, voice, video and still images and high quality voice communication, it also provides enhanced spectrum efficiency, wide-area coverage and the future capability of end-to-end voice and data encryption.

Through the sophistication of the system, communications will now be possible from anywhere in the metropolitan area. It will no longer be necessary for professional mobile radio users to carry multiple radios to access other local communications systems.

Says Johan van Zyl, managing director of Alcom, "We are delighted to have been awarded this significant contract with the CMC. As the sole distributor of Motorola land mobile radio products and systems in South Africa, we will be able to provide a one-stop-solution for the supply, integration and maintenance of the CMC radio network, which we believe is the most effective for the region. The larger Cape Metropolitan community will benefit greatly from this improved safety and security communications infrastructure, allowing for rapid response times to a range of emergency situations."

Says Mark Ellis, director of sales (Africa), Motorola, "We are very pleased to be playing a role in revolutionising the CMC's communications infrastructure. With more than 30 TETRA contracts worldwide, Motorola's breadth of products and services and our alliance with Alcom, we are ideally positioned to supply the CMC with this service."

Due to the Cape's mountainous terrain, this TETRA system requires 19 base stations, with a total of 37 TDMA (Time Division Multiple Access) channels, with each TDMA channel consisting of four channels, to handle the predicted traffic and up to 36 separate dispatcher points. As the CMC is supplying the communications infrastructure, it is up to each individual municipality and public safety service to

purchase the required subscriber equipment.

Along with the Motorola SmartZone system supplied by Alcom Systems for the SAPS a couple of years ago, the Western Cape is now in a position to boast about having the two most sophisticated communications networks in South Africa.
